

IN THE CLAIMS:

Please **CANCEL** claim 1 without prejudice or disclaimer, **ADD** claims 22-30, and **AMEND** claims 2-5, 8-12, and 14-17, As follows:

1. (CANCELLED)

2. (CURRENTLY AMENDED) ~~The electrolyte for the lithium-sulfur battery of claim 1~~ An electrolyte for a lithium-sulfur battery having a positive and negative electrode, comprising:

a first solvent having a dielectric constant that is greater than or equal to 20;

a second solvent having a viscosity that is less than or equal to 1.3; and

an electrolyte salt,

wherein said first solvent is at least one selected from a group consisting of ~~ethylene carbonate, propylene carbonate, dimethyl sulfoxide, sulforane, γ-butyrolactone, acetonitrile, dimethyl formamide, methanol, hexamethyl phosphoramidate, ethanol, and isopropanol.~~

3. (CURRENTLY AMENDED) ~~The electrolyte for the lithium-sulfur battery of claim 1~~ An electrolyte for a lithium-sulfur battery having a positive and negative electrode, comprising:

a first solvent having a dielectric constant that is greater than or equal to 20;

a second solvent having a viscosity that is less than or equal to 1.3; and

an electrolyte salt,

wherein said second solvent is at least one selected from a group consisting of methylethyl ketone, pyridine, methyl formate, ~~tetrahydrofuran, diglyme (2-methoxyethyl ether), 1,3-dioxolane, methyl acetate, 2-methyl tetrahydrofuran, ethyl acetate, n-propyl acetate, ethyl propionate, methyl propionate, ethyl ether, diethyl carbonate, methylethyl carbonate, dimethyl carbonate, toluene, fluorotoluene, 1,2-dimethoxy ethane, benzene, fluorobenzene, p-dioxane, and cyclohexane.~~

4. (CURRENTLY AMENDED) ~~The electrolyte for the lithium-sulfur battery of claim 1~~ An electrolyte for a lithium-sulfur battery having a positive and negative electrode, comprising:

a first solvent having a dielectric constant that is greater than or equal to 20;

a second solvent having a viscosity that is less than or equal to 1.3; and

an electrolyte salt,

wherein:

~~said the~~ first solvent is roughly between 20% and ~~80-40~~ 80-40 % by ~~volume-weight~~ weight of the electrolyte, and

~~said the~~ second solvent is roughly between ~~20~~ 80% and about ~~80~~ 60 % by ~~volume~~ weight of the electrolyte.

5. (CURRENTLY AMENDED) The electrolyte for the lithium-sulfur battery of claim 4, further comprising an additive that forms a solid electrolyte interface (SEI) at a surface of the negative electrode during charging.

6. (ORIGINAL) The electrolyte for the lithium-sulfur battery of claim 5, wherein said additive is at least one selected from a group consisting of vinylene carbonate, vinylene trithiocarbonate, ethylene trithiocarbonate, ethylene sulfite, ethylene sulfide and bismuth carbonate.


7. (ORIGINAL) The electrolyte for the lithium-sulfur battery of claim 5, wherein said additive is roughly between 0.2% and 10 % by weight of the electrolyte.

8. (CURRENTLY AMENDED) The electrolyte for the lithium-sulfur battery of claim 4, wherein said electrolyte salt is at least one selected from a group consisting of lithium

hexafluorophosphate (LiPF_6), lithium tetrafluoroborate (LiBF_4), lithium hexafluoroarsenate (LiAsF_6), lithium perchlorate (LiClO_4), lithium trifluoromethane sulfonyl imide ($\text{LiN}(\text{CF}_3\text{SO}_2)_2$), and lithium trifluorosulfonate ($\text{CF}_3\text{SO}_3\text{Li}$).

9. (CURRENTLY AMENDED) The electrolyte for the lithium-sulfur battery of claim 44, wherein a concentration of said electrolyte salt is roughly between 0.5 M and 2.0 M.

10. (CURRENTLY AMENDED) A lithium-sulfur battery comprising:

 a negative electrode comprising a negative active material selected from a group consisting of lithium metal, lithium-containing alloy, a combination electrode of a lithium/inactive sulfur, a compound that can reversibly intercalate lithium ion, and a compound that can reversibly redoxdate with a lithium ion at a surface;

an electrolyte comprising a first solvent having a dielectric constant that is greater than or equal to 20, a second solvent having a viscosity that is less than or equal to 1.3, and an electrolyte salt; and

a positive electrode comprising a positive active material comprising at least one sulfur-based material selected from a group consisting of a sulfur element, Li_2S_n ($n \geq 1$), an organic sulfur compound, and a carbon-sulfur polymer ($(\text{C}_2\text{S}_x)_n$ where $x=2.5$ to 50 and $n \geq 2$), and an electrically conductive material,

wherein

the first solvent is roughly between 20% and 40 % by weight of the electrolyte.

and

the second solvent is roughly between 80 % and about 60 % by weight of the electrolyte.

11. (CURRENTLY AMENDED) An electrolyte for a lithium-sulfur battery, comprising:

a first solvent having a polarity high enough to dissolve an ionic compound;

a second solvent having a viscosity that is less than or equal to 1.3; and

an electrolyte salt,

wherein

the first solvent is roughly between 20% and 40 % by weight of the electrolyte,

and

the second solvent is roughly between 80 % and about 60 % by weight of the

electrolyte.

12. (CURRENTLY AMENDED) A lithium-sulfur battery comprising:

a negative electrode comprising a negative active material;

an electrolyte comprising

a first solvent having a polarity high enough to dissolve an ionic compound,

a second solvent having a viscosity that is less than or equal to 1.3, and

an electrolyte salt; and

a positive electrode comprising a positive active material,

wherein

the first solvent is roughly between 20% and 40 % by weight of the electrolyte,

and

the second solvent is roughly between 80 % and about 60 % by weight of the

electrolyte.

13. (ORIGINAL) The lithium-sulfur battery of claim 12, wherein the first solvent has a dielectric constant that is greater than or equal to 20.

14. (CURRENTLY AMENDED) ~~The lithium-sulfur battery of claim 12~~ A lithium-sulfur battery comprising:

a negative electrode comprising a negative active material;

an electrolyte comprising

a first solvent having a polarity high enough to dissolve an ionic compound,

a second solvent having a viscosity that is less than or equal to 1.3, and

an electrolyte salt; and

a positive electrode comprising a positive active material,

wherein the first solvent is at least one selected from a group consisting of ethylene carbonate, propylene carbonate, dimethyl sulfoxide, sulforane, γ -butyrolactone, acetonitrile, dimethyl formamide, methanol, hexamethyl phosphoramide, ethanol, and isopropanol.

15. (CURRENTLY AMENDED) ~~The lithium-sulfur battery of claim 12~~ A lithium-sulfur battery comprising:

a negative electrode comprising a negative active material;

an electrolyte comprising

a first solvent having a polarity high enough to dissolve an ionic compound,

a second solvent having a viscosity that is less than or equal to 1.3, and

an electrolyte salt; and

a positive electrode comprising a positive active material,

wherein the second solvent is at least one selected from a group consisting of methylethyl ketone, pyridine, methyl formate, tetrahydrofuran, diglyme (2-methoxyethyl ether), 1,3-dioxolane, methyl acetate, 2-methyl tetrahydrofuran, ethyl acetate, n-propyl acetate, ethyl propionate, methyl propionate, ethyl ether, diethyl carbonate, methylethyl carbonate, dimethyl carbonate, toluene, fluorotoluene, 1,2-dimethoxy ethane, benzene, fluorobenzene, p-dioxane, and cyclohexane.

16. (CURRENTLY AMENDED) The lithium-sulfur battery of claim ~~42~~14, wherein:
the first solvent is roughly between 20% and 80 % by volume of said electrolyte, and
the second solvent is roughly between 20% and about 80 % by volume of said
electrolyte.

17. (CURRENTLY AMENDED) The lithium-sulfur battery of claim ~~42~~14, wherein a ratio of
the first solvent to the second solvent is roughly 1:1.

18. (ORIGINAL) The lithium-sulfur battery of claim 12, wherein said electrolyte further
comprises an additive that prevents the formation of dendrite on a surface of said negative
electrode during charging.

19. (ORIGINAL) The lithium-sulfur battery of claim 18, wherein the additive forms a solid
electrolyte interface (SEI) at the surface of said negative electrode.

20. (ORIGINAL) The lithium-sulfur battery of claim 18, wherein the additive is at least one
selected from a group consisting of vinylene carbonate, vinylene trithiocarbonate, ethylene
trithiocarbonate, ethylene sulfite, ethylene sulfide and bismuth carbonate.

21. (ORIGINAL) The lithium-sulfur battery of claim 18, wherein the additive is roughly
between 0.2% and 10% by weight of said electrolyte.

22. (NEW) The lithium-sulfur battery of claim 10, further comprising an additive that
forms a solid electrolyte interface (SEI) at a surface of the negative electrode during charging.

23. (NEW) The lithium-sulfur battery of claim 22, wherein said additive is at least one selected from a group consisting of vinylene carbonate, vinylene trithiocarbonate, ethylene trithiocarbonate, ethylene sulfite, ethylene sulfide and bismuth carbonate.

24. (NEW) The lithium-sulfur battery of claim 23, wherein said electrolyte salt is at least one selected from a group consisting of lithium hexafluorophosphate (LiPF_6), lithium tetrafluoroborate (LiBF_4), lithium hexafluoroarsenate (LiAsF_6), lithium perchlorate (LiClO_4), lithium trifluoromethane sulfonyl imide ($\text{LiN}(\text{CF}_3\text{SO}_2)_2$), and lithium trifluorosulfonate ($\text{CF}_3\text{SO}_3\text{Li}$).

25. (NEW) The electrolyte for the lithium-sulfur battery of claim 3, wherein said first solvent is sulfolane, and said second solvent is the toluene.

26. (NEW) The electrolyte for the lithium-sulfur battery of claim 3, wherein said first solvent is sulfolane, and said second solvent is the n-propyl acetate.

27. (NEW) The lithium-sulfur battery of claim 15, wherein said first solvent is sulfolane, and said second solvent is the toluene.

28. (NEW) The lithium-sulfur battery of claim 15, wherein said first solvent is sulfolane, and said second solvent is the n-propyl acetate.

29. (NEW) The electrolyte for the lithium-sulfur battery of claim 4, wherein the first solvent is at least one selected from a group consisting of ethylene carbonate, propylene carbonate, dimethyl sulfoxide, sulforane, γ -butyrolactone, acetonitrile, dimethyl formamide, methanol, hexamethyl phosphoramidate, ethanol, and isopropanol.

30. (NEW) The electrolyte for the lithium-sulfur battery of claim 4, wherein the second solvent is at least one selected from a group consisting of methylethyl ketone, pyridine, methyl formate, tetrahydrofuran, diglyme (2-methoxyethyl ether), 1,3-dioxolane, methyl acetate, 2-methyl tetrahydrofuran, ethyl acetate, n-propyl acetate, ethyl propionate, methyl propionate, ethyl ether, diethyl carbonate, methylethyl carbonate, dimethyl carbonate, toluene, fluorotoluene, 1,2-dimethoxy ethane, benzene, fluorobenzene, p-dioxane, and cyclohexane.
